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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/006,903	11/08/2001	Andrew Sendonais	010474	1496

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Qualcomm Incorporated
Patents Department
5775 Morehouse Drive
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EXAMINER	
BAYARD, EMMANUEL	

ART UNIT	PAPER NUMBER
2638	

DATE MAILED: 08/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/006,903	SENDONAIS, ANDREW	
	Examiner	Art Unit	
	Emmanuel Bayard	2638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

This is in response to amendment filed on 6/6/05 in which claims 1-31 are pending. The applicant's amendments have been fully considered but they are moot based on the new ground of rejection.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 2-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Brown et al U.S. patent No 6,498,805 B1.

As per claims 1 and 22 Brown et al teaches a method comprising: obtaining control symbols from a first wireless signal (see figs.1-2 and col.1, lines 13-15), the control symbols including pilot symbols and non-pilot symbols (see figs.1-2 elements 22 and 24 and col.3, lines 6-10 and col.4, lines 61-63); generating soft decisions for the non-pilot symbols (see fig.2 element 222 and col.3, lines 56-65); and using both the pilot symbols and the non-pilot symbols for feedback controlling is the same as the claimed (frequency tracking) of the first wireless signal (see figs. 1-2 element 28 or 242 or 276 and col.3, lines 12-23 and col.4, lines 1-60).

As per claim 3, Brown et al teaches wherein generating soft decisions for the non-pilot symbols comprises weighting each non-pilot symbol (see col.4, lines 1-12).

As per claim 4, Brown et al teaches wherein the soft decisions comprise non-pilot symbols multiplied by a weight factor (see col.4, lines 1-50).

As per claim 5, Brown et al teaches wherein using the pilot symbols and the soft decision for frequency tracking includes calculating a cross product (see fig.2 element 220) to generate a channel estimate is the same as the claimed (residual frequency error estimate) (see figs. 1-2 element 28 or 242 or 276 and col.3, lines 12-23 and col.4, lines 1-60).

As per claims 6-8, Brown et al teaches a phase rotation (see fig.2 elements 218 and 220 combined). It is well known in the art that phase rotation is defined by multiplying complex or imaginary conjugates or cosine or sinus conjugates with different signal symbols. Therefore Brown et al teaches inherently teaches wherein calculating the cross product comprises cross-multiplying one of the pilot symbols with a complex conjugate of one of the soft decisions.

As per claims 9-10, Brown et al inherently teaches wherein the first set and the second set include at least one common symbol.

As per claim 11, Brown et al teaches inherently comprising adjusting frequency of the first Wireless signal in response to the frequency tracking.

As per claim 12, Brown et al inherently teaches wherein the soft decisions include a decision as to whether the symbol is a 1 or a -1 and a confidence level of the decision as to whether the symbol is a 1 or a -1.

As per claims 13-14 since the phase rotation of Brown et al teaches is composed of cosine and sinus conjugates, applying a hyperbolic tangent function to calculate the soft decision will be inherently taught by Brown et al.

As per claim 15, Brown et al inherently teaches wherein generating the soft decision includes using a sign function to calculate a decision as to whether the non-pilot symbol is a 1 or a -1.

As per claim 16, Brown et al teaches wherein the first wireless signal is a spread spectrum CDMA signal (see col.2, line 67).

As per claim 17, Brown et al inherently teaches wherein weighing each non-pilot symbol includes weighting each non-pilot symbol according to strength of the first wireless signal.

As per claim 18, Brown et al inherently teaches wherein weighing each non-pilot symbol includes weighing each non-pilot symbol according to a signal-to-noise-plus interference ratio associated with the first wireless signal.

As per claim 19, Brown et al inherently teaches comprising calculating cross products to calculate residual frequency error estimates and accumulating the cross products to calculate an estimated frequency error of the first wireless signal.

As per claim 20, Brown et al inherently teaches wherein the non-pilot symbols include transport format combination indicators, transmit power control indicators and feedback indicators.

As per claim 21, Brown et al teaches a method comprising: obtaining control symbols from a first wireless signal (see figs.1-2 and col.1, lines 13-15), the control

symbols including pilot symbols and non-pilot symbols (see figs.1-2 elements 22 and 24 and col.3, lines 6-10 and col.4, lines 61-63); assigning a weight factor (see col.2, lines 45-47 and col.4, lines 1-60) to each non-pilot symbol; and using both the pilot symbols and weighted non-pilot symbols for feedback controlling is the same as the claimed (frequency tracking) of the first wireless signal (see figs. 1-2 element 28 or 242 or 276 and col.3, lines 12-23 and col.4, lines 1-60).

As per claim 23, Brown et al teach an apparatus comprising: a rotator (see fig.2 elements 218 and 220 combined) that adjusts signal frequency of a signal. It is well known in the art that a rotator is defined by multiplying complex or imaginary conjugates or cosine or sinus conjugates with different signal symbols. Therefore Brown et al teaches inherently teaches a rotator; and associated with the signal, wherein the feedback loop generates the estimate of the frequency error using pilot and non-pilot symbols (see figs 1-2 element 28 and col.3, lines 12-23 and col.4, lines 1-60).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 24-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brown et al U.S. Patent No 6,498,805 B1 in view of Sih et al U.S. Patent No 6,608,858 B1.

As per claim 24, Brown et al teaches all the features of the claimed invention except a transmitter/receiver that receives and conditions the signal before sending the signal to the rotator a demodulator that demodulates the signal after the rotator has adjusted signal frequency of the signal; a symbol generator that obtains the pilot and non-pilot symbols and a digital signal processor that processes the pilot and non-pilot symbols.

Sih et al teaches a transmitter/receiver (see col.2, line 51) that receives and conditions the signal before sending the signal to the rotator (see col.5, lines 33-50); a demodulator (see figs.6a, 7-9 elements 610, 700a, 800a, 900a and col.7, lines 65-66) that demodulates the signal after the rotator has adjusted signal frequency of the signal; a symbol generator is inherently taught by Sih that obtains the pilot and non-pilot symbols (see fig.3 and col.3, lines 1-14); and a digital signal processor (see fig.3 element 300 and col.3, lines 8-10) that processes the pilot and non-pilot symbols.

It would have been obvious to one of ordinary skill in the art to implement the teaching of Sih into Brown as to provide a tracking mechanism for removing the effects of error due to frequency offset as well as compensate for frequency error due to Doppler in the plurality of multi-path signals as taught by Sih (see abstract).

As per claim 25, Sih et al teaches a frequency discriminator (see fig.6a element 600) and an accumulator (see col.3, lines 4-15), wherein the frequency discriminator calculates residual frequency error estimates using the pilot and non-pilot symbols and sends the residual frequency error estimates to the accumulator to generate the estimate of the frequency error (see col.4, lines 5-15 and col.6, lines 42-65).

Furthermore implementing such teaching into Brown would have been obvious to one skilled in the art as to provide a tracking mechanism for removing the effects of error due to frequency offset as well as compensate for frequency error due to Doppler in the plurality of multi-path signals as taught by Sih (see abstract).

As per claim 26, Sih et al teaches tracking frequency in different base stations (see col.3, lines 21-26 and col.4, lines 5-15 and col.6, lines 42-65). Furthermore implementing the teaching Sih et al into Brown as to perform feedback loop having a soft decision generator that generates soft decisions for the non-pilot symbols, wherein the frequency discriminator calculates residual frequency error estimates using the pilot symbols and the soft decisions would have been obvious to one skilled in the art as to provide a tracking mechanism for removing the effects of error due to frequency offset as well as compensate for frequency error due to Doppler in the plurality of multi-path signals as taught by Sih (see abstract).

As per claim 27 since the phase rotation of Brown et al teaches is composed of cosine and sinus conjugates, applying a hyperbolic tangent function to calculate the soft decision will be inherently taught by Brown et al.

As per claim 28, Sih et al teaches wherein using the pilot symbols and the soft decision for frequency tracking includes calculating a cross product to generate a residual frequency error estimate (see fig.6a and col.4, lines 5-15 and col.6, lines 54-67 and col.7, lines 64-67). Furthermore implementing such teaching into Brown would have been obvious to one skilled in the art as to provide a tracking mechanism for removing

the effects of error due to frequency offset as well as compensate for frequency error due to Doppler in the plurality of multi-path signals as taught by Sih (see abstract).

As per claim 29, Sih et al teaches wherein the apparatus forms part of a RAKE receiver, the apparatus further comprising: a number of rotators (see figs.7-9 elements 706a- 706n, 806a-806n, 906a-906n) that adjust signal frequency of a number of signals tracked by a number of fingers; and a number of feedback loops (see figs.7-9 elements 704a-704n, 804a-804n 904a-904n) to the number of rotators that provide estimates of frequency errors associated with the signals, wherein the feedback loops generate the estimates of the frequency errors using pilot and non-pilot symbols. Furthermore implementing such teaching into Brown would have been obvious to one skilled in the art as to provide a tracking mechanism for removing the effects of error due to frequency offset as well as compensate for frequency error due to Doppler in the plurality of multi-path signals as taught by Sih (see abstract).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sih et al U.S. Patent No 6,608,858 in view of Brown et al U.S. Patent No 6,498,805 B1.

As per claim 30, Sih et al teaches an apparatus comprising: an antenna (see fig.2 element 200 and fig.4); transmitter/receiver (see col.2, line 51) coupled to the

antenna that receives a signal and conditions the signal; a rotator (see figs.7-8 elements 706a, 806a, 906a) coupled to the transmitter/receiver that adjusts frequency of the signal (see col.5, lines 33-50); a demodulator a demodulator (see figs.6a, 7-9 elements 610, 700a, 800a, 900a and col.7, lines 65-66) coupled to the rotator that demodulates the signal; a symbol generator is inherently taught by Sih et al (see fig.3 and col.3, lines 1-14) coupled to the demodulator that obtains control symbols from the demodulated signal, the control symbols including pilot and non-pilot; a frequency discriminator (see fig.6a element 600) that calculates residual frequency error estimates using the pilot symbols and the soft decisions; and an accumulator (see col.3, lines 4-15) coupled to the frequency discriminator and the rotator that accumulates an error estimate associated with the signal, wherein the rotator adjusts frequency of the signal based on the error estimate associated with the signal (see col.4, lines 5-15, 33-50 and col.6, lines 42-65).

However Sih does not teach a soft decision generator that generates soft decisions for the non-pilot symbols; a frequency discriminator coupled to the soft decision generator that calculates residual frequency error estimates using the pilot symbols and the soft decision.

Brown et al teaches a soft decision generator (see fig.2 element 222 and col.3, lines 56-65) that generates soft decisions for the non-pilot symbols; a feedback controlling is the same as the claimed (frequency discriminator) coupled to the soft decision generator that calculates residual frequency error estimates using the pilot

symbols and the soft decision (see figs. 1-2 element 28 or 242 or 276 and col.3, lines 12-23 and col.4, lines 1-60).

It would have been obvious to one of ordinary skill in the art to implement the teaching of Brown into Sih as to determine either pass a frame containing error threshold or until a predetermined number of iteration of channel phase estimate for a symbol would be detected as recited by Brown (see abstract.)

As per claim 31, Sih et al teaches, wherein the apparatus forms part of a RAKE Receiver (see col.3, lines 1-2 and col.6, lines 1-2, the apparatus further comprising: a number of fingers (see figs. 7-9 element 700a-706n) that track a number of signals, wherein each finger includes a rotator (see element 706a), a demodulator (see fig.6a element 610 and col.7, lines 63-67) coupled to the rotator, a symbol generator a symbol generator is inherently taught by Sih et al (see fig.3 and col.3, lines 1-14) coupled to the demodulator. Therefore Sih et al inherently teaches a soft decision generator (soft handoff base stations) (soft decisions) coupled to the symbols generator; a frequency discriminator (see fig.6a element 600) coupled to the soft decision generator, and an accumulator (see col.4, lines 5-15, 33-50 and col.6, lines 42-65) coupled to the frequency discriminator and the rotator. Furthermore implementing such teaching into Brown would have been obvious to one skilled in the art as to provide a tracking mechanism for removing the effects of error due to frequency offset as well as compensate for frequency error due to Doppler in the plurality of multi-path signals as taught by Sih (see abstract).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Zhengdi US Pub No 2003/0210667 A1 teaches channel estimation in a Cellular communication system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Bayard whose telephone number is 571 272 3016. The examiner can normally be reached on Monday-Friday (7:Am-4:30PM) Alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vanderpuye Kenneth can be reached on 571 272 3078. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Emmanuel Bayard
Primary Examiner
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EMMANUEL BAYARD
PRIMARY EXAMINER